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RI/FS WORK PLAN ADDENDUM: OPERABLE UNIT 4 K-65 AND METAL OXIDES SILOS AND SUBSOILS SAMPLING AND ANALYSIS PLAN (WITH TREATABILITY PLAN) JANUARY 1990

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ENCLOSURE

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REMEDIAL INVESTIGATION AND FEASIBILITY STUDY (RI/FS)
FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO

RI/FS WORK PLAN ADDENDUM:
OPERABLE UNIT 4

K-65 AND METAL OXIDES SILOS AND SUBSOILS
SAMPLING AND ANALYSIS PLAN
(WITH TREATABILITY PLAN)

January 1990

Revision 0

1693

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SECTION 1.0 - INTRODUCTION

This section summarizes the Operable Unit 4 Sampling and Analysis Plan (SAP) objective and organization, as well as identifying site-specific project work plans required for the implementation of this RI/FS Work Plan Addendum.

1.1 SAMPLING PLAN OBJECTIVE

This RI/FS Work Plan Addendum for the K-65 and metal oxides silos and subsoils SAP will supplement and expand the present silo based material collection efforts originally defined in the "Implementation Plan for the K-65 and Metal Oxide Residue Sampling Project at the Feed Materials Production Center (FMPC) Fernald, Ohio," Rev. 5, by providing the following:

- Additional engineering properties analyses to more fully evaluate the silo residues mechanical behavior for various FS remediation alternatives
- Radiological, chemical, and geotechnical sampling and analysis of the K-65 silo embankment and below-silo soils. The analytical results will be used to determine and verify the extent of contamination in the soils surrounding the K-65 silos, as well as enhancing the available below silo geological data.

1.2 FMPC SITE-SPECIFIC PROJECT WORK PLANS

The implementation of this Operable Unit 4 SAP requires utilization of the following volumes defined under the "RI/FS, FMPC, Work Plan," Revision 3, dated March 31, 1988.

- Volume I - Sampling Plan
- Volume II - Health and Safety Plan
- Volume IV - Data Management Plan
- Volume V - Quality Assurance Project Plan (QAPP).

1.2.1 K-65 and Metal Oxide Silo Residues

The silo residues will be sampled by Westinghouse Materials Company of Ohio (WMCO) and analyzed utilizing the "Implementation Plan for the K-65 and Metal Oxide Residue Sampling Project at the FMPC," Rev. 5.

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1.2.2 K-65 Silo Embankment and Subsoils

The soils surrounding the K-65 silos will be sampled and analyzed per the "RI/FS, FMPC Work Plan," Revision 3, dated March 31, 1988.

1.3 SAMPLING AND ANALYSIS PLAN ORGANIZATION

The various elements of this plan are arranged and located in the following sections:

- Section 2.0 - K-65 and Metal Oxide Silo Residues Sample Analysis
- Section 3.0 - K-65 Silo Embankment and Subsoils Sample Analysis
- Section 4.0 - Treatability Testing of Residues.

SECTION 2.0 - K-65 AND METAL OXIDE SILO RESIDUES SAMPLE ANALYSIS

The K-65 and metal oxide samples will be analyzed for physical, chemical, and radiological parameters as described in the following subsections.

2.1 RADIOLOGICAL AND CHEMICAL ANALYSIS

Selected K-65 and metal oxide samples will be analyzed for radiological and chemical constituents to characterize the material for the evaluation of disposal options. The required radiological analyses are listed below:

- Isotopic uranium
- Isotopic thorium
- Isotopic radium
- Pb-210
- Qualitative alpha and gamma spectroscopy.

Selected samples will also be analyzed for the following chemical parameters:

- HSL inorganics
- HSL volatiles
- HSL semivolatiles
- HSL pesticides and PCBs
- EP toxic metals.

Sample sectioning, selection, preparation, and analysis will be performed by WMCO in accordance with the Site-Specific Project Work Plans specified in Section 1.2.1, this Work Plan Addendum. For general informational purposes, Table 1 and the Appendix shows the number of radiological/chemical analytical tests as well as sampling locations and a completion schedule.

2.2 PHYSICAL ANALYSES

The referenced physical analyses of the K-65 and metal oxide residues (see Table 2) will be used to determine the following:

- Estimates of achievable waste placement densities during bulk packaging operations:

- ASTM D698-78
- ASTM D1557-78
- ASTM D4253-83
- ASTM D4254-83
- ASTM D4318-84

- Estimates of existing or potential in situ waste settlement:

  - ASTM D2435-80
  - In situ soils density determination

    a. ASTM D422-63
    b. ASTM D854-83
    c. ASTM D2216-80
    d. ASTM D4318-84

- Assist in the preliminary selection of specific waste removal/treatment equipment and handling methods:

  - In situ soils density determination
  - Additional tests on same core sample
  - EM 1110-2-1906
  - ASTM D422-63
  - ASTM D854-83
  - ASTM D2216-80
  - ASTM D4318-84

- Estimates of localized waste surface bearing capacities during dome cavity filling operations:

  - EM 1110-2-1906
  - In situ soils density determination.

The proposed physical analyses standards and procedures are provided in Table 2, and the number of specific analytical tests including sample sizes, locations, and completion schedule is shown in Table 1.

Analytical testing for physical properties must be conducted, as specified, under the appropriate ASTM standards and laboratory procedures using qualified geotechnical laboratory technician(s) and properly calibrated apparatus which

meet the intent of ASTM D3740-80, "Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction".

There is an exception to the above ASTM standards. Vibra-core sampler barrels with the configuration described in the "Implementation Plan for the K-65 and Metal Oxide Residue Sampling Project at the Feed Materials Production Center" will be substituted for the smaller diameter thin-walled tube samplers (ASTM D1587) typically specified in the standards and procedures. Care shall be exercised when handling the completed core barrels to minimize sample disturbance. Sample preparation including trimming will be performed, and WMCO cut core barrels will be inspected for disturbance by a qualified geotechnical laboratory technician(s) using a preapproved technique.

Table 1. K-65 and Metal Oxide Residues: Physical, Radiological, and Chemical Test Schedule

Test Designation	Performed By	Minimum No. of Tests	Time to[e] Complete Test	Minimum Sample Size	Sampling Location, Each Silo[c]
Radiological					
Isotopic uranium	IT Analytical	33	8 weeks after receipt of samples	Note C	Note C
Isotopic thorium		33			
Isotopic radium		33			
Qualitative alpha and gamma spectroscopy		33			
Chemical					
HSL inorganics	IT Analytical	33	8 weeks after receipt of samples	Note C	Note C
HSL volatiles		33			
HSL pesticides and PCBs		33			
EP toxic metals		33			
ASTM Procedure					
D2216-80	Geotechnical Subcontractor	9[a]	12 weeks after receipt of samples	[a]	See in situ density determination
D4318-84		9[a]	12 weeks after receipt of samples	[a]	See in situ density determination
D854-83		9[a]	12 weeks after receipt of samples	[a]	See in situ density determination
D422-63		9[a]	12 weeks after receipt of samples	[a]	See in situ density determination
D2435-80		6	12 weeks after receipt of samples	6 cores, 12 inch length, each[d]	Zones B/2 and B/3 or Zones B/3 and B/4
D698-78[b]		3	12 weeks after receipt of samples	9 Kg per silo	Combine equal portions from Zones A, B, and C

Table 1. (Continued)

Test Designation	Performed By	Minimum No. of Tests	Time to[e] Complete Test	Minimum Sample Size	Sampling Location, Each Silo[c]
D1557-78[b]	IT Analytical	3	12 weeks after receipt of samples	11 Kg per silo	Combine equal portions from Zones A, B, and C
D4253-83/ D4254-83[b]		3	12 weeks after receipt of samples	25 Kg per silo	Combine equal portions from Zones A, B, and C
Department of the Army					
EM1110-2-1906 (CU Test)	Geotechnical Subcontractor	6 at 3 points each	12 weeks after receipt of samples	6 cores, 24 inch length, each[d]	Zones A/3 and A/4, two cores per silo
None specified					
In situ density determination	Geotechnical Subcontractor	9	12 weeks after receipt of samples	9 cores, 12 inch length, each[d]	Zone A/3 or A/4, Zone B/3 or B/4, and Zone C/2 or C/3

[a]This test is performed on material obtained from in situ density determination tests.
[b]Composite sample.
[c]Sample size, preparation, and location are based on the "Implementation Plan for the K-65 and Metal Oxide Residue Sampling Project at the Feed Materials Production Center," Latest Revision; for core sectioning legend, see Figures 3-1 through 3-3 and Table 3-2 in Attachment A.
[d]Sample core selections will be field determined based on estimates of sample disturbance by a qualified technician.
[e]See Figure 2 for bar chart schedule.

Table 2. Engineering Properties Parameters

Method Title	Reference
Water Content Determination	ASTM D2216-80, "Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Atterberg Limits	ASTM D4318-84, "Standard Test Methods for Liquid Limit, Plastic Limit, and Plastic Index of Soils," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Specific Gravity Determination	ASTM D854-83, "Standard Test Method for Specific Gravity of Soils," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Grain Size Distribution with Hydrometer Analysis	ASTM D422-63, "Particle Size Analysis of Soils," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rocks; Building Stones; Geotextiles
One-Dimensional Consolidation	ASTM D2435-80, "One Dimensional Consolidation Properties of Soils," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Consolidated Undrained Triaxial with Pore Pressure	EM 1110-2-1906, "Engineering and Design, Laboratory Testing Manual," Department of the Army.
Standard Proctor	ASTM D698-78, "Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 kg) Rammer and 12 in (305 mm) Drop," 1987 Annual Book of ASTM Standards, Vol. 04.08 Soil and Rock ; Building Stones; Geotextiles
Modified Proctor	ASTM D1557-78, "Test Methods for Moisture-Density Relationships of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 kg) Rammer and 18 in. (457 mm) Drop," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles

Table 2. (Continued)

Method Title	Reference
Maximum Index Density	ASTM D4253-83, "Test Methods for Maximum Index Density of Soils Using a Vibratory Table," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Minimum Index Density	ASTM D4254-83, "Test Methods for Minimum Index Density of Soils and Calculation of Relative Density," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock, Building Stones; Geotextiles
In Situ Soils Density Determination	No ASTM Designation

SECTION 3.0 - K-65 SILO EMBANKMENT AND SUBSOILS SAMPLE ANALYSIS

Based on the following historical information the K-65 silo embankment and below-silo soils, denoted subsoils, will be analyzed for geotechnical, chemical, and radiological parameters:

- The K-65 silo leakage history as documented in a memorandum from R.C. Heatherton, National Lead Company of Ohio (NLO), to Central Files, NLO, dated November 25, 1953, Subject: "K-65 Storage Tank No. 1".
- A preliminary radiological assessment performed by IT Corporation indicating the presence of silo-derived radon daughter products, lead 210, polonium 210, and stable lead in the soils surrounding the K-65 silos.
- The existence of a buried underground decant tank, historically known as the upper sump, and associated piping system adjacent to and underneath the silos. The system was used to transport K-65 waste slurry and decanted silo liquids between the silos and the production plant.

The K-65 silos embankment and subsoils will be sampled utilizing a two phase approach with the resultant analytical characterizations used to determine and verify the extent of contamination in the soils surrounding the K-65 silos. The analytical tests including sample sizes and completion schedule are exhibited for Phase I in Table 3. Figure 1 shows the sample locations.

3.1 PHASED SAMPLING

The following subsections describe the phased approach used for the K-65 silo embankment and subsoils sampling effort.

3.1.1 Phase I

The Phase I sampling pattern (Figure 1) provides a preliminary evaluation of contaminants in the surrounding K-65 silo soils and will consist of the following elements:

- A total of five low angle borings will provide continuous sampling using 30-inch-long shelby tubes or lexan sleeves with the specified samples collected at 20-foot intervals. The samples will be taken in five foot intervals which are centered on each of the designated

sample point locations shown in Figure 1. The first 2½ foot length of the 5 foot sample interval will be analyzed for chemical constituents; while the second 2½ feet length will be analyzed for radiological constituents and geotechnical parameters. The balance of unused material and/or tubes will be sealed and archived. All boring logs shall be maintained, samples collected, and analyses performed per the RI/FS Work Plan requirements.

- Three low angle borings will be placed from west to east below the elevation of the silo foundations as shown in Figure 1. Each boring will provide eight samples at 20-foot intervals. These borings are the most critical for preliminary evaluation of contaminants in the underlying silo soils. Borings 1 and 3 pass under the silos flanged decant ports, the concrete floors, and clay fill/leachate collection systems, while boring 2 passes near the abandoned decant tank and below various underground concrete process pipeline trenches and valve pits.

- Boring 4 will be placed from the southeast to northwest below Silo 1, terminate 20 feet from the center, and provide four samples

- Boring 5 will be placed from the southeast to northwest below silo 2, terminate 20 feet from the center, and provide five samples

- Four vertical borings, hand or power augered, approximately 3 feet from the exterior silo walls to sample retrieval depths of 10 feet and 20 feet (or the maximum depth achievable between 10 and 20 feet), two samples each boring location

- One fluid and one sediment sample will be recovered from the underground decant tank

- Sample analysis will be as specified in Sections 3.2 and 3.3 with summary presented in Table 3

- All materials retrieved from the sample location points shown in Figure 1 will be analyzed for geotechnical, radiological, and possibly chemical characteristics.

3.1.2 Phase II

Contingent on the results of the Phase I effort, Risk Assessment (RA) and Feasibility Study (FS) teams will provide additional geotechnical, radiological, and chemical sampling recommendations. It is expected that the sum of Phase I and II sampling points will not exceed the requested total number of points shown for the radiological sampling initially proposed in the following documents:

- Memorandum from D.E. Harmer/IT-Knoxville to R.M. Galbraith/IT-Fernald, dated June 13, 1989; subject: Request for K-65 silo subsurface soils sampling program.

- Memorandum from T.H. Tank/IT-Knoxville to R.M. Galbraith/IT-Fernald, dated June 21, 1989; subject: Modification to drilling configuration, K-65 silo subsurface soils sampling program.

3.2 RADIOLOGICAL AND CHEMICAL ANALYSES

Specified embankment and subsoil samples will be analyzed for radiological and chemical constituents. The required radiological analyses are listed below:

- Full radiological analysis as defined in the "RI/FS, FMPC, Work Plan," dated March 31, 1988

- Pb-210 (sample concentrations of polonium 210 can also be determined from this analysis, because there has been sufficient storage time to allow the nuclides to reach secular equilibrium).

Specified samples will also be analyzed for the following chemical parameters:

- Full HSL analysis as defined in the "RI/FS, FMPC, Work Plan," dated March 31, 1988

- EP toxic metals.

Sample preparation and analysis will be performed in accordance with the site-specific project work plans specified in Section 1.2, this Work Plan Addendum.

3.3 GEOTECHNICAL ANALYSES

The physical properties of the embankment and subsoils will be used to determine the expected soils behavior during remedial alternative soil conditioning, such as grout injection, as well as general geological and descriptive geotechnical parameters. The proposed analyses ASTM standards and procedures are identified in Table 4.

All sample analytical testing must be conducted as specified under the appropriate ASTM standards and laboratory procedures using qualified geotechnical techncian(s) and properly calibrated apparatus which meet the intent of ASTM D3740-80. Documentation for the testing will conform to the standards set forth in the "RI/FS, FMPC Work Plan," QAPP.

Table 3. K-65 Embankment and Subsoils
Geotechnical, Chemical, and Radiological Test Schedule

Test Type	Performed By	Minimum No. of Tests	Required Test[d] Completion Date	Minimum Sample Size Per Test	Sample Location
Full radiological analysis per "RI/FS, FMPC, Work Plan," dated March 31, 1988	IT Corp	40	8 weeks after receipt of sample	1.1 Kg per Series (Total = 39 Kg)	Per Figure 1
P_b210		40			
Full HSL analysis per "RI/FS, FMPC, Work Plan," dated March 31, 1988	IT Corp	40[a]	8 weeks after receipt of sample	1.3 Kg per Series (Total=46 kg)	Per Figure 1
EP Toxic Metals		40[a]			
ASTM D2216-80	Geo-Technical Sub Contractor	38[b]	8 weeks after receipt of samples	Note C	Per Figure 1
ASTM D4318-84		38[b]		125 g	
ASTM D854-83		38[b]		Note C	
ASTM D422-63		38[b]		4 Kg	
ASTM D2487-85		38[b]		Note C	

[a]Dependent on the results of K-65 residue analysis.
[b]Decant tank sediment will not have geotechnical analysis.
[c]Dual purpose sample.
[d]See Figure 2 for bar chart schedule.

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Table 4. Geotechnical Properties

Method Title	REFERENCE
Water Content Determination	ASTM D2216-80, "Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Atterberg Limits	ASTM D4318-84, "Standard Test Methods for Liquid Limit, Plastic Limit, and Plastic Index of Soils," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Specific Gravity Determination	ASTM D854-83, "Standard Test Method for Specific Gravity of Soils," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Grain Size	ASTM D422-63, "Particle Size Analysis of Soils," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock; Building Stones; Geotextiles
Soils Classification	ASTM D2487-85, "Standard Test Method for Classification of Soils for Engineering Purposes," 1987 Annual Book of ASTM Standards Vol. 04.08 Soil and Rock: Building Stones; Geotextiles

SECTION 4.0 - TREATABILITY TESTING OF RESIDUES

The following treatability testing plan is designed to define treatability parameters for the eight remaining alternatives for the FS for operable unit 4 (see the Task 12 report, "Initial Screening of Alternatives). These tests will provide needed data to select a preferred alternative and evaluate the risks associated with each alternative. A precise program is not defined in order to allow flexibility during the testing since initial results frequently define the next step. No treatability testing will be required on the Silo 3 material because the alternatives for Silo 3 include only removal, packaging, and disposal. Current plans call for the soils under the silos and berms to be handled in Operable Unit 4. No treatability studies are presently planned for the soils surrounding the K-65 silos because there is no information on the extent of contamination. Any treatability testing of the soils will be defined after the type and extent of contamination is identified.

4.1 ALTERNATIVE 1: NON-REMOVAL SILO ISOLATION

No treatability testing is required for this alternative.

4.2 ALTERNATIVE 2: IN SITU STABILIZATION

WMCO is to contract with Battelle Northwest for in situ verification testing. No testing of the soils surrounding the K-65 silos is required for this alternative.

4.3 ALTERNATIVES 3 AND 4: REMOVAL OF METAL OXIDES FROM SILO 3

This alternative required no treatability testing. No treatment of the Silo 3 material is included in these alternatives, only removal, packaging, and disposal.

4.4 ALTERNATIVES 6 AND 7: REMOVAL AND TREATMENT OF K-65 SILOS MATERIAL

Solidification treatability testing will be required to determine the correct formula for proper setting of the material.

Bench scale and vitrification testing will be conducted by Battelle Northwest.

4.5 ALTERNATIVES 8 AND 9: CONTAMINANT REMOVAL

Extractability of the hazardous and radioactive components from the wastes will be determined to evaluate the premise of these alternatives. Various acids, concentrations, and additives will be tried.

After extraction, effective separation will be necessary. Therefore, solid/liquid separation tests and wash tests will be conducted.

After separation, the dissolved hazardous and radioactive components must be reprecipitated and treated. Precipitation and separation of these components must be evaluated.

The separated materials will then be either vitrified or solidified. Solidification and vitrification tests on the separated material must be conducted.

Table 5. Treatability Testing

Test Type	Performed By	Approximate Number of Tests	Time to[b] Complete Test	Approximate Sample Size of Each Sample	Sample Location
A Extractions Nitric Acid Hydrochloric Acid Mixtures Time & Temp Concentrations	IT Corp	82	4 weeks after receipt of samples	1 Kg	K-65 Contents
B Washing & Separation -Filtration -Evap/drying -Centrifuge -Misc	IT Corp	15	1 week after extractions	100 g	K-65 Contents
C Precipitation of Leached Materials	IT Corp	30	1 week after extractions	100 g	K-65 Contents
D Solidification/ Stabilization of Leached Material	IT Corp	12[a]	4 weeks after extractions	500 g	K-65 Contents
E Solidifciation/ Stabilization of Untreated K-65 Material	IT Corp	12[a]	4 weeks after receipt of samples	500 g	K-65 Contents
F Bench Scale Vitrification	Battelle Northwest (WMCO SUB)	One series	9 months to 1 year	200 Kg (min) 300 Kg (desired)	K-65 Contents

[a]Includes EP toxic analyses.
[b]See Figure 2 for bar chart schedule.

ATTACHMENTS

ATTACHMENT

Table and Figures taken from the "Implementation Plan for the K-65 and Metal Oxide Residue Sampling Project at the Feed Materials Production Center," Revision 5

- Table 3-2
- Figure 3-1
- Figure 3-2
- Figure 3-3

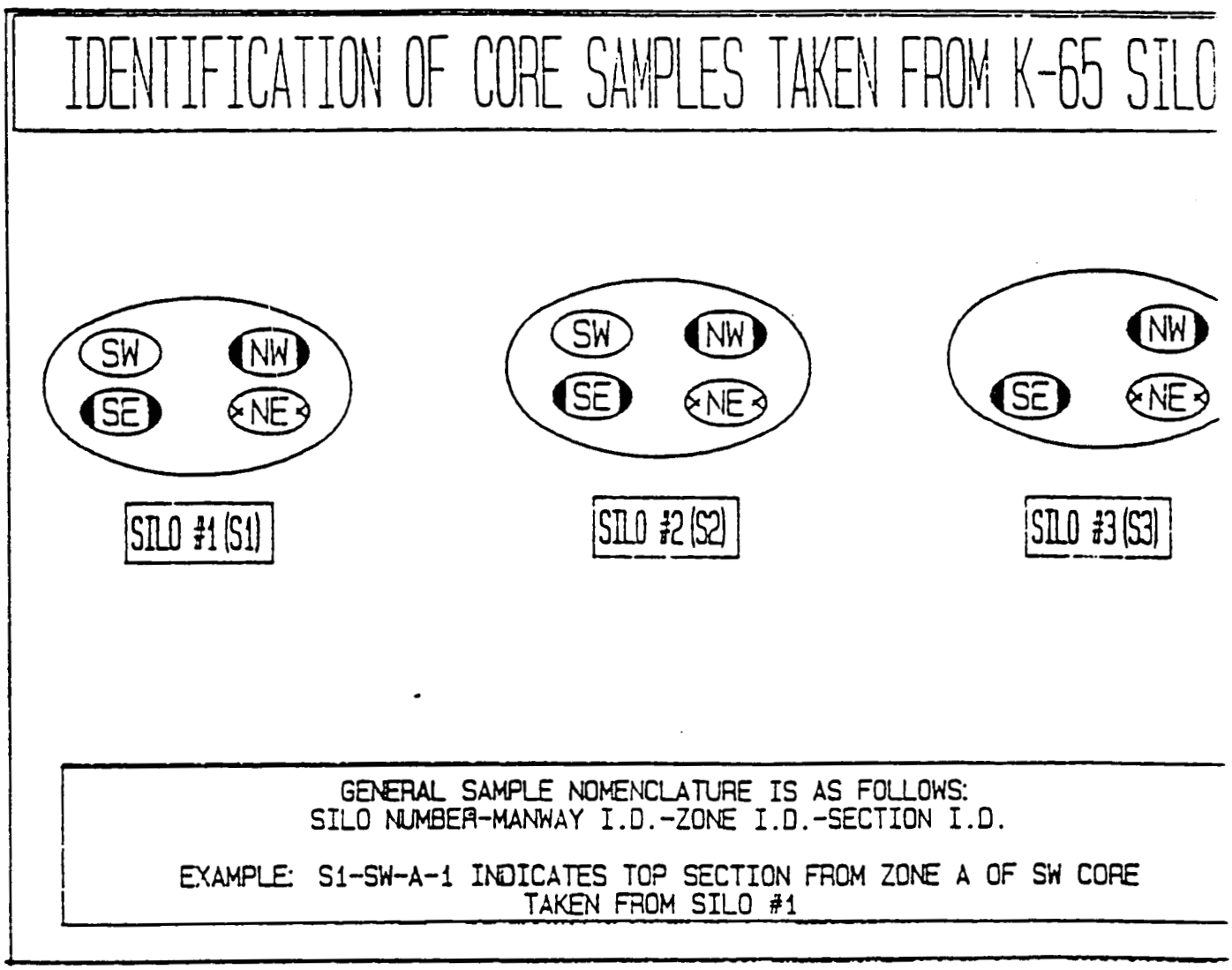
Table 3-2

MINIMUM NUMBER SAMPLES GENERATED FROM K-65 PROJECT FOR SPECIFIED DETERMINATIONS.

SAMPLE NO.	CORE SECTIONS SAMPLED:	ANALYSES REQUESTED
1	S1-SE-A-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
2	S1-SE-B-1,2,3,4,& 5	HSL INORGANICS,EP TOX, & ISOTOPICS
3	S1-SE-C-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
4	S1-SE-D-3	HSL INORGANICS,EP TOX, & ISOTOPICS
5(COMP.)	S1-SE-A-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
	S1-SE-B-1,2,3,4,& 5	
	S1-SE-C-1,2,3,& 4	
6	S1-NW-A-1,2,3,& 4	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
7	S1-NW-B-1,2,3,4,& 5	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
8	S1-NW-C-1,2,3,& 4	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
9	S1-NW-D-3	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
10(COMP.)	S1-NW-A-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
	S1-NW-B-1,2,3,4,& 5	
	S1-NW-C-1,2,3,& 4	
11	S2-SE-A-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
12	S2-SE-B-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
13	S2-SE-C-1,2,3,4,& 5	HSL INORGANICS,EP TOX, & ISOTOPICS
14	S2-SE-D-1	HSL INORGANICS,EP TOX, & ISOTOPICS
15(COMP)	S2-SE-A-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPTICS
	S2-SE-B-1,2,3,& 4	
	S2-SE-C-1,2,3,4,& 5	
16	S2-NW-A-1,2,3,4,& 5	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
17	S2-NW-B-1,2,3,& 4	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
18	S2-NW-C-1,2,3,& 4	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
19	S2-NW-D-1	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
20(COMP)	S2-NW-A-1,2,3,4,& 5	HSL INORGANICS,EP TOX, & ISOTOPICS
	S2-NW-B-1,2,3,& 4	
	S2-NW-C-1,2,3,& 4	
21	S3-SE-A-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
22	S3-SE-B*-1,2,3,4,& 5	HSL INORGANICS,EP TOX, & ISOTOPICS
23	S3-SE-C-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
24	S3-SE-D-3	HSL INORGANICS,EP TOX, & ISOTOPICS
25(COMP)	S3-SE-A-1,2,3,& 4	HSL INORGANICS,EP TOX, & ISOTOPICS
	S3-SE-B*-1,2,3,4,& 5	
	S3-SE-C-1,2,3,& 4	
26	S3-NW-A-1,2,3,& 4	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES
27	S3-NW-B-1,2,3,& 4	HSL INORGANICS,EP TOX,ISOTOPICS,HSL ORGANICS,PCBs, & PESTICIDES

FOR IDENTIFICATION OF SAMPLE CORE SECTIONS SAMPLED REFER TO SECTIONING OF SE/NW DIAGRAM

Figure 3-1


IDENTIFICATION OF CORE SAMPLES TAKEN FROM K-65 SILO
SW
NW
SE
NE
SILO #1 (S1)
SW
NW
SE
NE
SILO #2 (S2)
NW
SE
NE
SILO #3 (S3)
GENERAL SAMPLE NOMENCLATURE IS AS FOLLOWS:
SILO NUMBER-MANWAY I.D.-ZONE I.D.-SECTION I.D.
EXAMPLE: S1-SW-A-1 INDICATES TOP SECTION FROM ZONE A OF SW CORE TAKEN FROM SILO #1

SECTIONING OF SE AND NW SAMPLE CORES

REPRESENTATIVE CORE SUBSAMPLES WILL BE TAKEN FROM ALL OF THE SPECIFIED ZONES BELOW. THESE ZONES WILL BE DETERMINED BY PHYSICAL VARIABILITY AND RADIOACTIVITY OR IF PHYSICAL VARIABILITY IS LIMITED THEN CORE WILL BE DIVIDED INTO TOP (A), MIDDLE (B), AND BOTTOM (C) ZONES. ALL SECTIONS OF EACH ZONE WILL BE 18" IN LENGTH. REPRESENTATIVE SAMPLES WILL BE TAKEN FROM EACH ZONE FOR SUCH ANALYTICAL TESTS AS HSL INORGANICS, EP TOX, AND ISOTOPICS. A COMPOSITE SAMPLE WILL BE MADE UP OF REPRESENTATIVE SUBSAMPLES OF ALL ZONES OF EACH CORE AND SUBMITTED FOR SAME ANALYTICAL TESTS AS INDIVIDUAL ZONE SAMPLES.

* ADDITIONAL ANALYTICAL TESTS OF HSL ORGANICS, PCBs, AND PESTICIDES WILL BE REQUIRED ON ALL INDIVIDUAL ZONE SAMPLES OF ALL NW CORE SAMPLES.

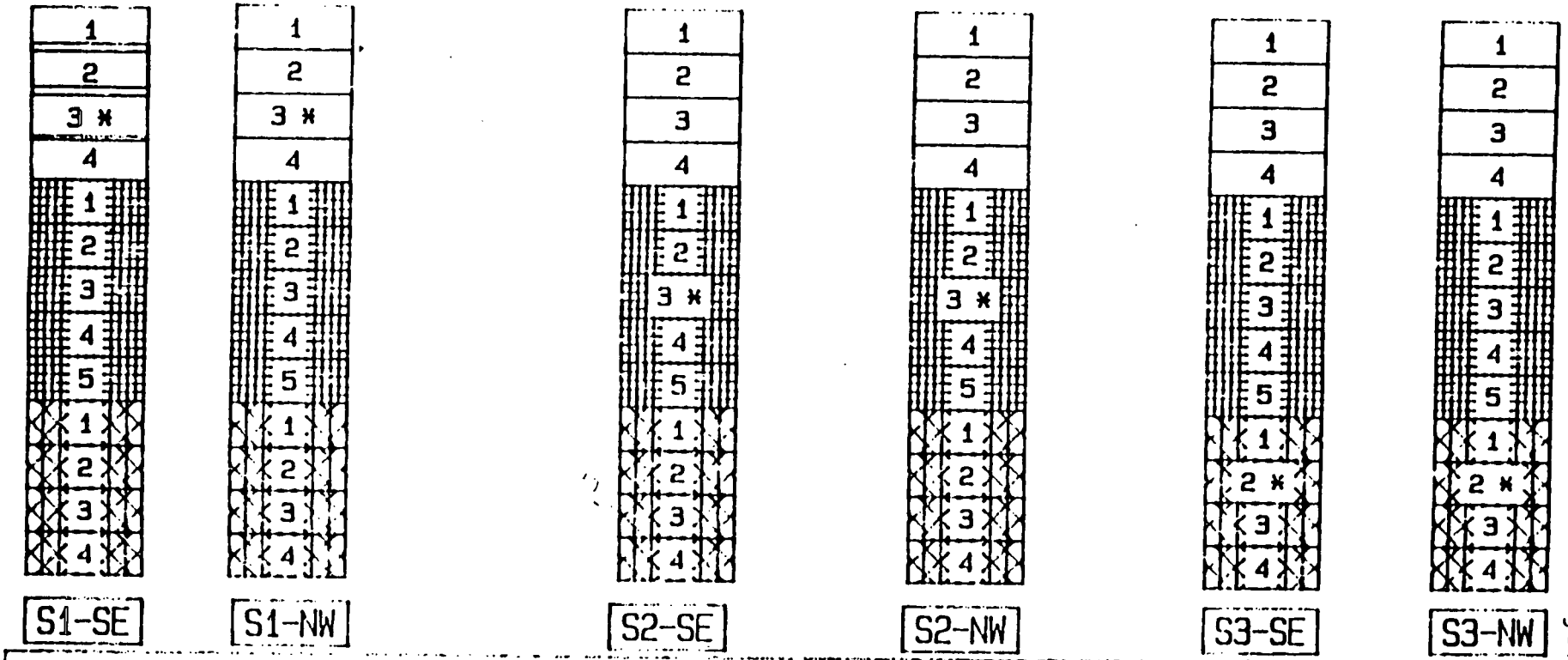
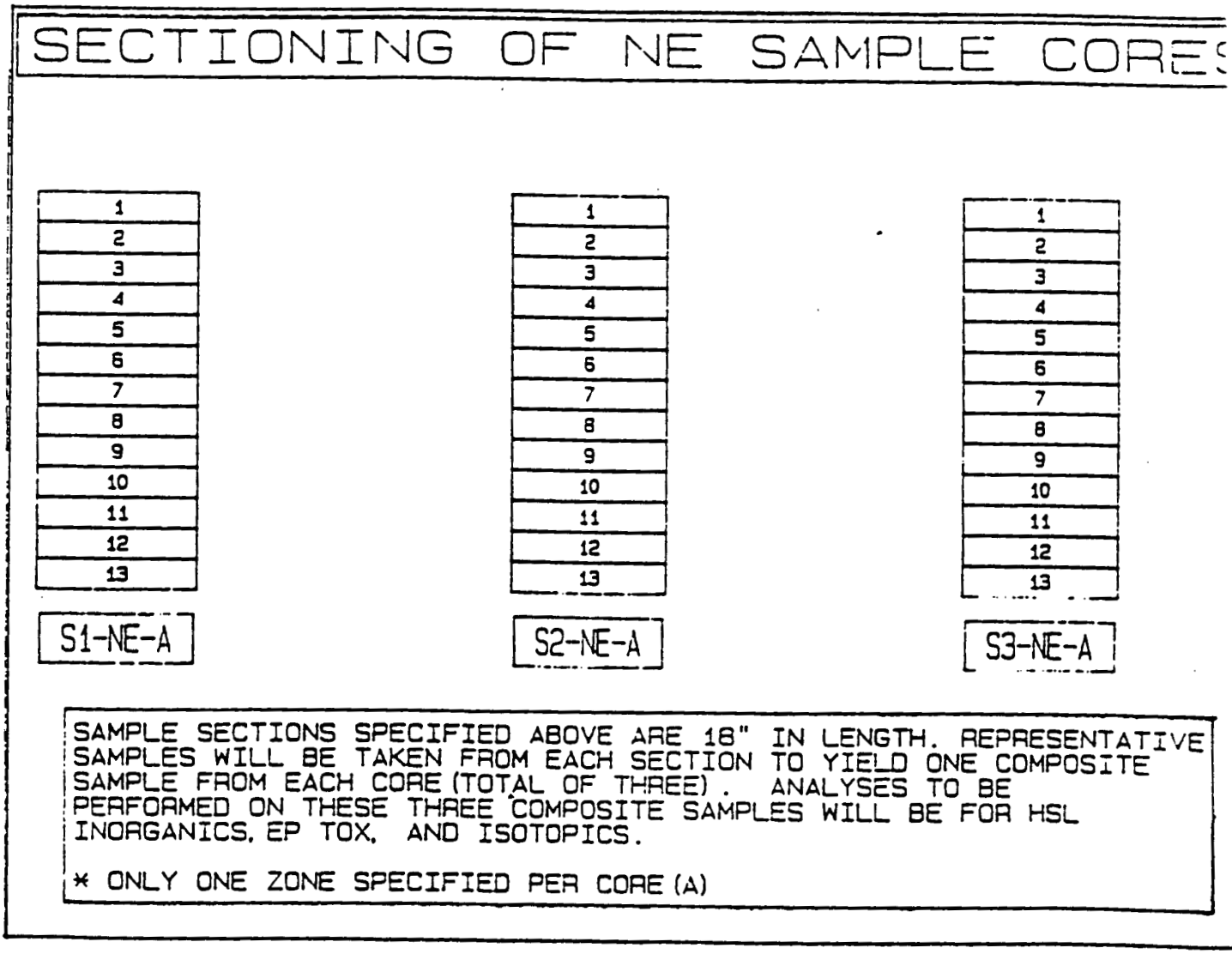
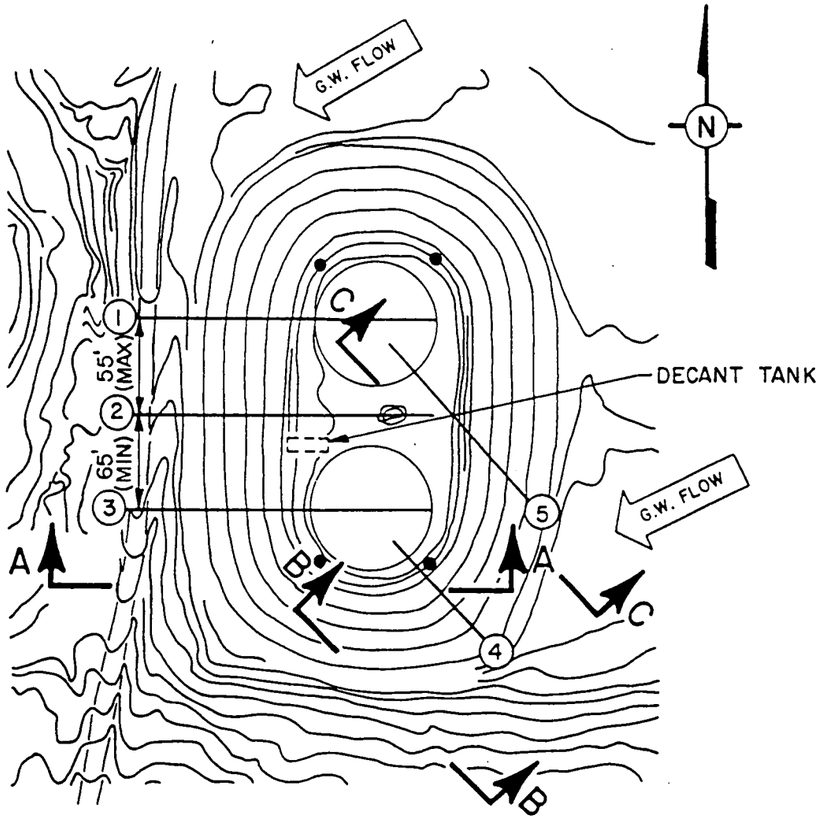


Figure 3-2

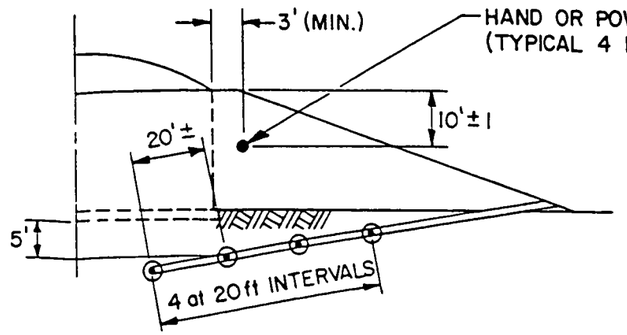
Section: Subsection: 11
Date:
Page: 7 of

Figure 3-3

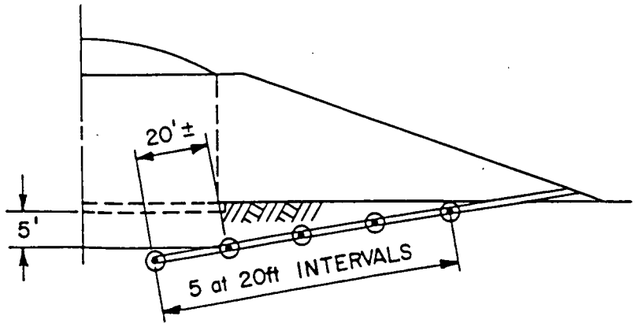

SECTIONING OF NE SAMPLE CORES
1
2
3
4
5
6
7
8
9
10
11
12
13
S1-NE-A
1
2
3
4
5
6
7
8
9
10
11
12
13
S2-NE-A
1
2
3
4
5
6
7
8
9
10
11
12
13
S3-NE-A
SAMPLE SECTIONS SPECIFIED ABOVE ARE 18" IN LENGTH. REPRESENTATIVE SAMPLES WILL BE TAKEN FROM EACH SECTION TO YIELD ONE COMPOSITE SAMPLE FROM EACH CORE (TOTAL OF THREE). ANALYSES TO BE PERFORMED ON THESE THREE COMPOSITE SAMPLES WILL BE FOR HSL INORGANICS, EP TOX, AND ISOTOPICS.
* ONLY ONE ZONE SPECIFIED PER CORE (A)



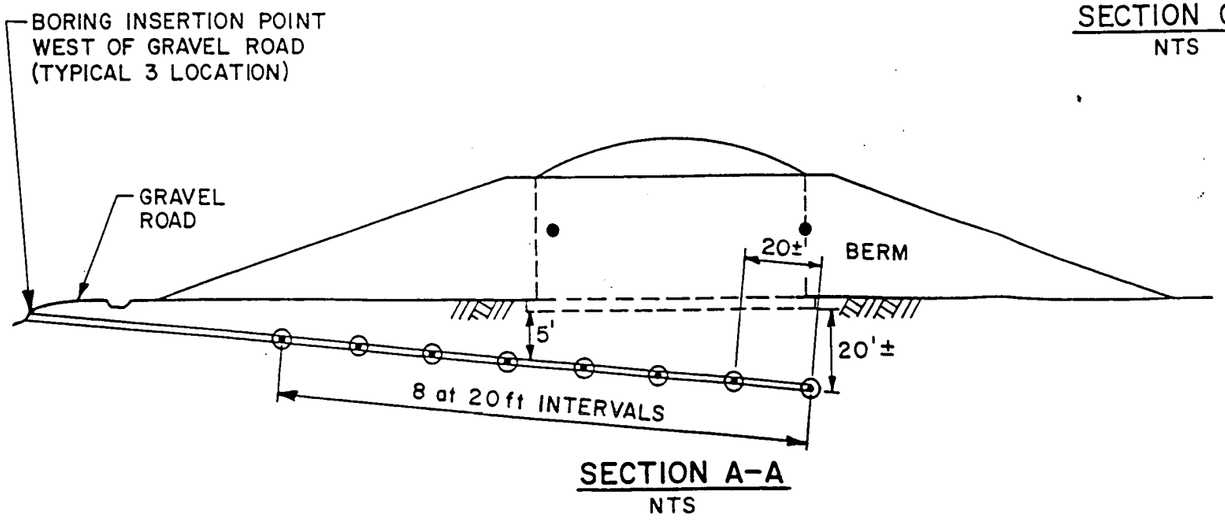
PHASE I BORING LAYOUT
NTS



SECTION B-B
NTS



SECTION C-C
NTS



SECTION A-A
NTS

LEGEND

- ● NON-DIAGONAL BORING SAMPLE LOCATION
- ⊙ DIAGONAL BORING SAMPLE LOCATION
- ① THROUGH ⑤ DIAGONAL BORING ALIGNMENT
- G.W. FLOW

NOTES

1. FOR DECANT TANK DETAILS SEE DWGS. 34X1450P00074 34X3500A00067
2. FILL ALL ABANDONED BORINGS WITH A CEMENT GROUT CONTAINING 10% BENTONITE (MIN.)
3. GENERAL LAYOUT K-65 STORAGE AREA: DWG. 3034-H-53-A, REV. 3
4. FLOW DIAGRAM OF K-65 TRENCH PIPING: DWG. 34-4008, REV. 0
5. K-65 TANK EMBANKMENT STABILIZATION GENERAL LAYOUT: DWG. 34X5500G00084, REV. 1

FIGURE 1

PHASE I SAMPLING CONFIGURATION
OPERABLE UNIT 4

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWING NO.: 303317-B-C20
PROJECT NO.: 303317
INITIATOR: T. TANK
PROJ. MGR.: D. HARMER
DATE LAST REV.:
DRAWN BY:
STARTING DATE: 11-8-89
DRAWN BY: C. HINSHAW
BRUNING 72425

FIGURE 2. Sampling, Analysis, and Treatability Bar Chart Schedule